

## 6 Monitoring, Assessment, and Performance Measures

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### Overview

Attachment 6 presents the planned project monitoring, assessment, and performance measures that will demonstrate that the Proposal will meet its intended goals, achieve measurable outcomes, and provide value to the State of California. The purpose of this Attachment is to provide information that would be used in the monitoring plan for the each project. Each project is described with its associated monitoring, assessment, and performance measures which are rolled-up into the Exhibit 6 Summary.

### 6.1 Project 1 – Cross Valley Canal to Calloway Canal Intertie

#### 6.1.1 *Baseline Condition*

Historical records of diversion and use, including the amount of water conveyed through any given canal or pumping plant, are available for each from the operators Cawelo, ID-4, and North Kern. Each district prepares monthly reports on deliveries and operations, which are accumulated into annual reports. At the end of each month, records are shared with the entity responsible for overseeing the water supply. Kern River flow diversions are measured by the City of Bakersfield and reported to the Kern River Water Master. State Water Project (SWP) deliveries are measured by DWR and reconciled with the Kern County Water Agency (KCWA).

Cross Valley Canal (CVC) deliveries are measured by KCWA and reconciled with DWR, the City of Bakersfield, Friant Water Users Authority and the districts receiving the water, depending on the source of water conveyed in the CVC. These records are readily available on at least a monthly basis, and in some cases, daily, for the last 25-30 years.

Groundwater levels are measured by each district semi-annually. Representative water wells are measured and the data is provided in reports to each district's Board of Directors and submitted for publication in the Semitropic Water Storage District Water Banking Project Monitoring Reports. Dedicated monitoring wells and idle water production wells are measured with calibrated wire sounders.

KCWA ID4 prepares an annual Report on Water Conditions which documents project operations costs, sources of water for the water purification plant, and chemical costs. This report is presented to the KCWA Board of Directors at a public hearing held every year.

### **6.1.2 Project Performance**

The CVC to Calloway Intertie Project includes metering which will allow flows to be measured in either direction. When the Project is in operation, daily measurements will be made and recorded to verify that water ordered was delivered. Project performance will be based on comparison of the post-project deliveries through the Intertie to the pre-project deliveries through Pump Station A (PS-A). The pre-project deliveries will be based on historical records of PS-A and CVC operations including currents deliveries and power usage through those facilities. Comparison would involve consideration of both monthly and annual volumes. The post-project performance will be directly measurable by documenting the volume of water that is diverted either from or into the Cross Valley Canal through the proposed Intertie.

### **6.1.3 Assessment**

Each benefit requires a slightly different assessment of the deliveries as described below.

**Conserved Water** – To evaluate conserved water, records will be maintained of the amount of SWP Article 21 water that is diverted from the Cross Valley Canal into the new turnout and delivered to spreading capacity in North Kern (through the Intertie). KCWA provides monthly reports of CVC operations which document daily deliveries. The measurements taken at each turnout are balanced with DWR records at the California Aqueduct.

Groundwater levels measured during the semi-annual monitoring runs will document groundwater changes associated with the conserved water.

**Avoided Operations and Maintenance Costs** – Diversions from the Cross Valley Canal to North Kern (through the Intertie) , up to the existing Pump Station A (PS A) capacity of 165 cfs, reflect avoided operations and maintenance costs associated with use of PS A and CVC PP7 and reaches of canals, i.e., the amount of such diversions multiplied by the unit cost of operations and maintenance at pump Station A and CVC Pumping Plant 7 (in \$/acre-foot) and associated canal pool will be the avoided costs. Tabulation will be prepared each year summarizing the water better managed by using the Project instead of the historic route for deliveries. This summary will be provided to the district Board of Directors annually for five years to document the savings.

**Avoided Pumping Costs** – Diversions from the Cross Valley Canal to North Kern (through the Intertie) up to the existing Pump Station A (PS A) capacity of 165 cfs reflect avoided pumping costs associated with use of PS A and the CVC PP7, i.e., the amount of such diversions multiplied by the unit cost of pumping energy at pump Station A and CVC Pumping Plant 7. (in \$/acre-foot) will be the avoided costs. Tabulation will be prepared each year summarizing the power cost savings

attributable to the water better managed by using the Project instead of the historic route for deliveries. This summary will be provided to the district Board of Directors annually for five years to document the savings.

**Avoided Treatment Costs** – Records of the deliveries of water from ID4 to North Kern (through the Intertie) will be maintained and compared to the Baseline Condition, where the latter is simply an average of the records of historical deliveries. Annual chemical costs will be divided by the volume of water treated and compared to the baseline chemical costs. In other words, the Project benefit will be measured by the amount by which the annual with-Project chemical costs are compared to the average annual historical chemical costs.

**Flood Damage Reduction** – To evaluate reduction in flood damages, records will be maintained of the amount of Kern River water that is diverted from the Calloway Canal into the new intertie with the Cross Valley Canal and Friant-Kern flood water delivered to spreading capacity in North Kern through the Intertie. KCWA provides monthly reports of CVC operations which document daily deliveries. The Kern River Water Master provides records of Kern River flows through Bakersfield and outflow from Isabella Reservoir. The measurements taken at each turnout/turn-in are balanced with DWR records at the California Aqueduct for flow into the Aqueduct.

With regard to quantification of actual project benefits “upon completion of the project”, it is noted that this will not be practicable immediately upon completion; rather, it could take several years, depending on hydrology, to obtain a meaningful measure of Project benefits.

**Exhibit 6.1-1**

## Project 1 Summary of Monitoring, Assessment, and Performance Measure

Project Goal	Desired Outcome	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Increase water supply reliability.	Conserve and optimize use of water by capturing high flow water for recharge and later recovery.	Daily and monthly deliveries from SWP to CVC and new Intertie.  Document groundwater levels before and after flows are	Compare deliveries with historic records.  Determine if groundwater levels are rising as a result of conserved water.	Rated meters and gates are used by facility operators to quantify deliveries. These measurements are then compared to those of other entities responsible for the supply.	5,700 acre-feet per year.
Minimize Water Supply Costs	Decrease O&M, Pumping Costs and Avoid treatment costs.	Daily and monthly deliveries through new Intertie.	Compare deliveries to historic records and review power costs for use of the pump stations.	Rated meters and gates are used by facility operators to quantify deliveries.  Power records of pump stations are also kept as prepared by the respective utility.  Tabulate information to compute a theoretical power cost as if without project facilities were used.	17,600 of historic PS-A use and 25,000 acre-feet of treatment plant exchange potential.
Enhance flood control.	Decrease flood damages.	Daily and monthly records of Kern River and Friant-Kern flood flows, and records of new Intertie use.	Compare deliveries with historic records	Rated meters and gates are used by facility operators to quantify deliveries.  Records of flooding are kept by Tulare Lake Basin WSD and Kern River Water Master.	Divert 61,200 acre-feet off the Kern River during flood releases and reduce flooding in Tulare Lake Bed by 14,000 acres.

**Exhibit 6.1-2**

## Project 1 Questions Based on Criteria Provided in Proposal Solicitation Package

Items	Explanation
Is the project contained in the proposal consistent with the Basin Plan?	Yes, the Tulare Lake Regional Basin Plan has objectives to decrease groundwater level declines and associated water quality issues. The CVC to Calloway Intertie helps accomplish these goals.
Do the output indicators effectively track output?	Yes, the entities responsible for operating local and regional facilities have been doing so and tracking operations for decades.
List the output indicators and describe relevance of indicators to track output of the project.	SWP delivery records are published annually through Bulletin 132. CVC records are presented monthly to the KCWA Board of Directors and CVC Advisory Committee. Kern River Water Master publishes monthly summaries and annual reports.

Items	Explanation
Are the outcome indicators adequate to evaluate change resulting from this project?	Yes, there is a significant historic record of use of the original facilities and to the extent they continue to be used, the measurements will continue.
Describe the importance of outcome indicators to evaluate change resulting from the project? <sup>1</sup>	The outcome indicators are the same as those used on a regular basis to document water management in the Southern San Joaquin Valley. Without those records quantifying the benefits of importation and regulation of supplies would not be possible.
Is it feasible to meet the targets within the life of the proposal?	Yes, the frequency of Article 21 and Kern River flood flows is well documented. At least 5 Kern River events and 15 Article 21 events could occur over the life of the Project.

<sup>1</sup>Indicators may include: additional acre-feet of water supply, improved water supply reliability and flexibility, water quality measurements, measurement-based estimates of pollution load reductions, acres of habitat successfully restored, feet of stream channel stabilized, groundwater level measurements, stream flow measurements, improved flood control, or other quantitative measures.

### Exhibit 6.1-3

#### Project 1 Summary of Monitoring Plan

Monitoring Plan Features	Monitoring Plan Details
Monitoring Parameters	Water Deliveries Groundwater Levels
Location of facilities to be monitored and entity	Water Deliveries will be monitored at the Intertie by the CVC staff, at the Aqueduct by DWR, at the Kern River/Calloway Weir by City of Bakersfield, at North Kern spreading facilities or grower turnouts by North Kern.  Groundwater levels will be monitored at key wells throughout North Kern, Shafter-Wasco and Cawelo by their respective staff.
Measures to remedy or react to problems encountered during monitoring	Facility operators will contact facility superintendents if measuring devices are not operational. Estimates based on previous history of readings will be made until repaired or new meters are installed. Measurements will be balanced with deliveries from primary source of supply and other delivery points to ensure accurate records.  Wells that cannot be measured will be removed from list and nearby wells will be located to continue water level records in the same vicinity.
Monitoring Frequency	Intertie – Daily when operating Water Wells – Semiannually
Frequency of performance evaluation and reporting	Annually by North Kern and reported to the Poso Creek Regional Water Management Group

### 6.1.4 Appendices

No appendices for this Section.

### 6.1.5 Tables

No tables for this Section

## **6.2 Project 2 – Madera Avenue Intertie**

### **6.2.1 Baseline Condition**

Historical records of diversion and use, including the amount of water conveyed through any given canal or pumping plant, are available for each of Semitropic and Shafter-Wasco. Each district prepares monthly reports on deliveries and operations, which are accumulated into annual reports. At the end of each month, records are shared with the entity responsible for overseeing the water supply. Kern River flow diversions are measured by the City of Bakersfield and reported to the Kern River Water Master. State Water Project deliveries are measured by DWR and reconciled with the Kern County Water Agency and DWR. Friant Kern deliveries are measured by the Friant Water Authority and the districts receiving the water. The entity providing the measurements depends on the source of water conveyed in the Madera Avenue Intertie. These records are readily available on at least a monthly basis, and in some cases, daily, for the last 25-30 years for the existing backbone system of each district.

Groundwater levels are measured by each district semi-annually. Representative water wells are measured and the data is provided in reports to each district's Board of Directors and submitted for publication in the Semitropic Water Storage District Water Banking Project Monitoring Reports. Dedicated monitoring wells and idle water production wells are measured with calibrated wire sounders.

### **6.2.2 Project Performance**

The *Madera Avenue Intertie Project* includes metering which will allow flows to be measured in either direction. When the Project is used daily measurements will be made and recorded to verify that water ordered was delivered. Project performance will be based on the amount of water conveyed through the Project. Since there is currently no facility at this location, the pre-project condition will be zero. Comparison would involve consideration of both monthly and annual volumes. The post-project performance will be directly measurable by documenting the volume of water that is diverted either from or into each district through the proposed Intertie.

### **6.2.3 Assessment**

Each benefit requires a slightly different assessment of the deliveries as described below.

**Conserved or Optimized Water** – To evaluate conserved or optimized water, records will be maintained of the amount of Friant-Kern water that is conveyed through the Intertie to Semitropic or in reverse to Shafter-Wasco. Recovered stored water conveyed back to Shafter-Wasco for direct delivery or for exchange with other CVP Contractors with access to the Friant-Kern Canal will also be quantified and compared to the deliveries made from the Friant-Kern to the districts taking receipt of

the water. The Friant Water Authority provides monthly reports of Friant-Kern Canal deliveries. The measurements taken at each turnout are balanced with district records at the Intertie.

Groundwater levels measured during the semi-annual monitoring runs will document groundwater changes associated with the conserved water.

**Avoided Pumping Costs** – Diversions from the Intertie into Semitropic reflect avoided pumping costs associated with use of grower wells on the lands served by the Project facilities, i.e., the amount of such diversions multiplied by the unit cost of pumping energy at each well. (in \$/acre-foot) will be the avoided costs. Tabulation will be prepared each year summarizing the power cost savings attributable to the water better managed by using the Project instead of the historic groundwater pumping. This summary will be provided to the district Board of Directors and Poso Creek Regional Water management Group annually for five years to document the savings.

Similarly, decreased groundwater pumping in the districts receiving the recovered water will be known by a comparison of surface water delivery records with irrigation demands and groundwater pumping records. Avoided pumping costs associated with use of grower wells on the lands receiving the recovered water, i.e., the amount of such diversions multiplied by the unit cost of pumping energy at each well. (in \$/acre-foot) will be the avoided costs. Tabulation will be prepared each year summarizing the power cost savings attributable to the water better managed by using the Project instead of the historic groundwater pumping. This summary will be provided to the district Board of Directors and the Poso Creek Regional Water management Group annually for five years to document the savings.

With regard to quantification of actual project benefits “upon completion of the project”, it is noted that this will not be practicable immediately upon completion; rather, it could take several years, depending on hydrology, to obtain a meaningful measure of Project benefits.

**Exhibit 6.2-1**

## Project 2 Summary of Monitoring, Assessment, and Performance Measure

Project Goal	Desired Outcome	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Increase water supply reliability.	Optimize use of water by capturing high flow water for recharge by in-lieu delivery.  Provide additional dry year yield to Poso Creek RWMG members.	Daily and monthly deliveries from SWID to Semitropic and Semitropic to SWID.  Daily and monthly deliveries from SWID to Exchange partner.  Document groundwater levels before and after flows are delivered.	Compare deliveries with historic records.  Determine if groundwater levels are rising as a result of conserved water.	Rated meters and gates are used by facility operators to quantify deliveries.  These measurements are then compared to those of other entities responsible for the supply.	7,500 acre-feet per year of activity.
Minimize Water Supply Costs	Decrease O&M, Pumping Costs.	Daily and monthly deliveries through new Intertie.  Daily and monthly deliveries from SWID to Exchange partner.	Compare deliveries to historic records and review power costs for use of the pump stations and water wells.	Rated meters and gates are used by facility operators to quantify deliveries.  Power records of pump stations are also kept as prepared by the respective utility.  Tabulate information to compute a theoretical power cost as if without project facilities were used.	7,500 acre-feet of exchange potential.

**Exhibit 6.2-2**

## Project 2 Questions Based on Criteria Provided in Proposal Solicitation Package

Items	Explanation
Is the project contained in the proposal consistent with the Basin Plan?	Yes, the Tulare Lake Regional Basin Plan has objectives to decrease groundwater level declines and associated water quality issues. The Madera Avenue Intertie helps accomplish these goals.
Do the output indicators effectively track output?	Yes, the entities responsible for operating local and regional facilities have been doing so and tracking operations for decades.
List the output indicators and describe relevance of indicators to track output of the project.	SWP delivery records are published annually through Bulletin 132.  CVP Friant-Kern records are presented monthly to the Friant Water Users Authority and Bureau of Reclamation.  Semitropic, Shafter-Wasco and their respective banking partners report deliveries monthly and annually to their respective Board of Directors and at least semiannually to the Semitropic Banking Project monitoring Committee.



Items	Explanation
Are the outcome indicators adequate to evaluate change resulting from this project?	Yes, there is a significant historic record of use of the original facilities and to the extent they continue to be used, the measurements will continue.
Describe the importance of outcome indicators to evaluate change resulting from the project? <sup>1</sup>	The outcome indicators are the same as those used on a regular basis to document water management in the Southern San Joaquin Valley. Without those records quantifying the benefits of importation and regulation of supplies would not be possible.
Is it feasible to meet the targets within the life of the proposal?	Yes, the frequency of CVP Delta water availability and full CVP Friant-Kern Class 1 supplies is well documented. At least 15 recharge and 15 recovery events could occur over the life of the Project.

<sup>1</sup>Indicators may include: additional acre-feet of water supply, improved water supply reliability and flexibility, water quality measurements, measurement-based estimates of pollution load reductions, acres of habitat successfully restored, feet of stream channel stabilized, groundwater level measurements, stream flow measurements, improved flood control, or other quantitative measures.

### Exhibit 6.2-3

#### Project 2 Summary of Monitoring Plan

Monitoring Plan Features	Monitoring Plan Details
Monitoring Parameters	Water Deliveries Groundwater Levels
Location of facilities to be monitored and entity	Water Deliveries will be monitored at the Intertie by Semitropic and Shafter Wasco staff, at the Friant-Kern by Friant Water Authority, at the Aqueduct by DWR.  Groundwater levels will be monitored at key wells throughout Shafter-Wasco, Semitropic, and Kern Tulare or other district storing water as a result of the Project.
Measures to remedy or react to problems encountered during monitoring	Facility operators will contact facility superintendents if measuring devices are not operational. Estimates based on previous history of readings will be made until repaired or new meters are installed. Measurements will be balanced with deliveries from primary source of supply and other delivery points to ensure accurate records.  Wells that cannot be measured will be removed from list and nearby wells will be located to continue water level records in the same vicinity.
Monitoring Frequency	Intertie – Daily when operating Water Wells – Semiannually
Frequency of performance evaluation and reporting	Annually by Semitropic and reported to the Poso Creek Regional Water Management Group

### 6.2.4 Appendices

No appendices for this Section.

### 6.2.5 Tables

No tables for this Section

## **6.3 Project 3 – Habitat Improvements on Pond-Poso and Turnipseed Spreading Grounds**

### **6.3.1 Baseline Condition**

Semitropic began constructing the existing Pond-Poso spreading basins in 2007 and was able to complete five of the nine quarter-sections of land in the fall of 2010. The five quarter-sections are operational and have been in use since September, 2010. The Turnipseed spreading basins are to be constructed in 2011. Both districts have received Federal funding through the U.S. Bureau of Reclamation's WaterSMART Program to enable phases of construction to continue on these two sites. The two sites comprise a total of 634 acres of active infiltration area. Records of applied water and water infiltrated are kept by Semitropic and DEID. Water levels in nearby monitoring wells are made semiannually to confirm change in groundwater storage. Currently there is no planted habitat existing at either site, each site has an establishment of local weeds and the districts would continue to mow periodically to control them.

### **6.3.2 Project Performance**

Project 3 would create 443 acres of wetland habitat within the Pond-Poso spreading basins and 70 Acres within the Turnipseed Basin. Grading, installation of irrigation, and planting of wetland areas would occur in year one. Partial planting of upland area shrubs and trees would occur in year one and be completed in year two. Weed control and replanting as necessary would occur through year five.

### **6.3.3 Assessment**

Each benefit requires a slightly different assessment of the deliveries as described below.

**Multiple uses of existing Water Supply** – To evaluate the efficiency of multiple use of water at each spreading basin, water delivered to each spreading basin will be measured at interbasin structures and groundwater measurements will be made at monitoring wells in the vicinity of the spreading basins. Groundwater levels measured during the semi-annual monitoring runs will document groundwater changes associated with the water delivered to each spreading basin. The amount of groundwater storage as a function of water delivered to the spreading basin will be compared to historical records.

**Enhanced Environmental Resources/ Habitat Established** – The area of wetland and riparian habitat established will be documented upon completion of the plantings. Documentation will include estimates of plant type and density as well as photographic documentation. Monitoring of performance will be documented at least annually during the first 5 years.

**Improved Water Quality** – Water quality samples will be taken from selected monitoring wells annually to document any change in water quality due to the establishment of wetland habitat. Baseline monitoring will occur before and during initial plantings.

**Enhanced Aesthetic Values** – During annual monitoring of habitat, photographs will be taken of key views from public roads to document changes in Aesthetic values. These photographs will be included in each annual habitat survey report.

With regard to quantification of actual project benefits “upon completion of the project”, it is noted that this will not be practicable immediately upon completion; rather, it could take several years, depending on climate and other factors, to obtain a meaningful measure of Project benefits.

**Exhibit 6.3-1**

Project 3 Summary of Monitoring, Assessment, and Performance Measure

Project Goal	Desired Outcome	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Enhance Environmental Resources	Establish wetland habitat and upland habitat	Establishment of appropriate plants for each habitat type	Stable plant communities in each habitat area  Use of habitat by vertebrate and insect species	Direct annual measurement of plant assemblages and acres occupied.	443 Acres of wetland habitat and 31 acres of riparian habitat at Pond-Poso site  70 Acres of wetland habitat and 3 acres of riparian habitat at Turnipseed site
Increase multiple use of water supply	Establishment of wetland and upland habitat with minimum loss of recharge capacity	Difference between historic recharge efficiency and efficiency after wetlands established.	Compare deliveries to historic records and historic groundwater recharge.	Rated meters and gates are used by facility operators to quantify deliveries.  Measurement in wells document change in ground-water storage	Insufficient background studies are available to suggest a target outcome.
Improve quality of infiltrated water	Reduced dissolved constituents such as nitrate (NO <sub>3</sub> ).	Water quality measurements of water delivered to the spreading basin and ground water quality.	Compare deliveries ground water quality with historic records	Direct samples of delivered water and water from monitoring wells.	Insufficient background studies are available to suggest a target outcome.

**Exhibit 6.3-2**

## Questions Based on Criteria Provided in Proposal Solicitation Package

Items	Explanation
Is the project contained in the proposal consistent with the Basin Plan?	Yes, the Tulare Lake Regional Basin Plan has objectives to improve groundwater quality. The establishment of wetlands helps accomplish that goal.
Do the output indicators effectively track output?	Yes, the entities responsible for operating local and regional facilities have been doing so and tracking operations for decades.
List the output indicators and describe relevance of indicators to track output of the project.	Recharge records are presented regularly to each District's Board of Directors.
Are the outcome indicators adequate to evaluate change resulting from this project?	Yes, there is a significant historic record of use of the original facilities and to the extent they continue to be used, the measurements will continue.
Describe the importance of outcome indicators to evaluate change resulting from the project.	Parameter used to establish success of new habitat, well documented in the literature.  The outcome indicators are the same as those used on a regular basis to document vegetation management in the Southern San Joaquin Valley. Without those records quantifying the benefits of habitat re-vegetation programs would not be possible.
Is it feasible to meet the targets within the life of the proposal?	Yes, establishment of wetland and uplands habitat for mitigation in California is well documented.

<sup>1</sup>Indicators may include: measurement-based estimates of pollution load reductions, acres of habitat successfully restored, groundwater level measurements, or other quantitative measures.

**Exhibit 6.3-3**

## Project 3 Summary of Monitoring Plan

Monitoring Plan Features	Monitoring Plan Details
Monitoring Parameters	Plant communities acreage and density  Groundwater levels and quality
Location of facilities to be monitored and entity	Pond Poso Spreading Grounds in Semitropic WSD and Turnipseed Ponds in Delano-Earlimart ID  Groundwater levels and quality will be monitored at key wells nearby the spreading grounds in each district.
Measures to remedy or react to problems encountered during monitoring	Facility inspectors will contact facility superintendents if plants are not surviving and measures will be taken to determine the cause and replant as necessary.  Wells that cannot be measured will be removed from list and nearby wells will be located to continue water level and quality records in the same vicinity.
Monitoring Frequency	Vegetation – Annually  Water Wells – Semiannually
Frequency of performance evaluation and reporting	Annually by Semitropic and DEID and reported to the Poso Creek Regional Water Management Group.

## **6.4 Project 4 – On-Farm Mobile Lab, Water Use Efficiency Services**

### **6.4.1 Baseline Condition**

The existing Poso Creek IRWM Region comprises about 500,000 acres and includes 350,000 acres of irrigated agriculture. The Mobile Lab is operated by the North West Kern Resource Conservation District (NWKRCDD) and has successfully served the Region for several years; the additional funding would allow continued and expanded operation. The evaluation or assessment process involved in observing a working irrigation system includes monitoring various components of the system. The NWKRCDD summarizes its Mobile Lab operations annually in reports to its Board of Directors and water districts where the evaluations occur.

### **6.4.2 Project Performance**

Project 4 would provide on-farm Mobile Lab evaluation of irrigation systems through its Water Use Efficiency Services. Overall they will provide irrigation efficiency assessments to at least 12,000 acres in the Region. The Mobile Lab will provide assistance to agricultural landowners in the Region and other portions of Kern County that consists of on-farm irrigation system evaluations and would be available to farms of all sizes. Contact will be made directly with growers that might benefit from an on-farm analysis within water districts of Kern County. On-site follow-up assessments are made to evaluate the increase in efficiency due to implementation of recommended measures.

### **6.4.3 Assessment**

Each benefit requires a slightly different assessment of the deliveries as described below.

**Increase Water Supply Reliability** – To evaluate the efficiency of each on-farm irrigation system, trained and experienced personnel would perform an on-site evaluation of the irrigation system. Using established criteria, an efficiency rating would be applied to the system its current condition. After any needed system improvements, a second evaluation would be performed to document improvement in efficiency. The actual water savings would be estimated based on historical/measured efficiency compared to the modified system.

**Minimize Water Supply Costs** – Changes in water supply costs will be calculated based on amount of reduction and per-unit costs of the applied water.

**Improved Water Quality** – Water quality samples will be taken from selected on-site wells to document any change in water quality due to the improvements recommended by the Mobile Lab evaluation team..

With regard to quantification of actual project benefits “upon completion of the project”, project benefits will be evaluated annually and contained in the annual report to the NWKRCB Board of Directors.

**Exhibit 6.4-1**

Project 4 Summary of Monitoring, Assessment, and Performance Measure

Project Goal	Desired Outcome	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Increase water supply reliability.	Optimize water use by improved irrigation system efficiency.	Reduced applied water.  Number of acres evaluated.	Increase in irrigation system efficiency.	Depending on system type:  Land leveling, tail-water use, application uniformity	Greater than 90% efficiency on at least 12,000 acres evaluated each year.
Minimize Water Supply Costs	Decrease Pumping Costs and fertilizer costs.	Reduced water applied.  Number of acres evaluated  Total application of nutrients	Compare amount of water used and amount of fertilizers applied to historic records.	Irrigation system meters and fertilizer application records.	Greater than 90% efficiency on at least 12,000 acres evaluated each year.  5% reduction in fertilizer use in areas of inefficient systems.
Improve quality	Reduced deep percolation of salts, fertilizers and pesticides.	Water quality measurements of water delivered for irrigation.	Compare irrigation water quality to ground water quality with historic records.	Direct samples of irrigation water and water from monitoring wells.	Improvement in Groundwater Quality, insufficient background studies are available to quantify a target.

**Exhibit 6.4-2**

Questions Based on Criteria Provided in Proposal Solicitation Package

Items	Explanation
Is the project contained in the proposal consistent with the Basin Plan?	Yes, the Tulare Lake Regional Basin Plan has objectives to decrease groundwater level declines and associated water quality degradation. Improved water conservation through improvement of irrigation system efficiency helps accomplish both objectives.
Do the output indicators effectively track output?	Yes, the entities responsible for operating the Mobile Lab have been doing so and tracking results for many years.
List the output indicators and describe relevance of indicators to track output of the project.	Mobile lab reports are presented Annually to the NWKRCB Board of Directors and contributing water districts.

Items	Explanation
Are the outcome indicators adequate to evaluate change resulting from this project?	Yes, there is a significant technical and scientific basis for the Mobile Lab evaluation techniques and judging their results through follow-up evaluations.
Describe the importance of outcome indicators to evaluate change resulting from the project	Parameter used to evaluate irrigation systems are well documented in the literature.  The outcome indicators are the same as those used on a regular basis to document efficient water management in the Southern San Joaquin Valley.
Is it feasible to meet the targets within the life of the proposal?	Yes, the capabilities of this mobile Lab operation are well established and well documented.

#### **Exhibit 6.4-3**

##### **Project 4 Summary of Monitoring Plan**

Monitoring Plan Features	Monitoring Plan Details
Monitoring Parameters	Number of growers/acres evaluated  Irrigation water quality  Groundwater quality
Location of facilities to be monitored and entity	Each district participating in the Project has an opportunity to be evaluated. District managers will coordinate with Mobile Lab operator.  Groundwater levels will be monitored at key wells through-out districts evaluated as a result of the Project.
Measures to remedy or react to problems encountered during monitoring	Mobile Lab operators will contact facility superintendents if measuring devices are not operational. Estimates based on previous history of readings will be made until repaired or new meters are installed.  Wells that cannot be measured will be removed from list and nearby wells will be located to continue water level records in the same vicinity.
Monitoring Frequency	Mobile Lab– Daily when operating  Water Wells – Semiannually
Frequency of performance evaluation and reporting	Annually by Mobile lab operator and reported to the NWKRCD

#### **6.4.4 Appendices**

No appendices for this Section.

#### **6.4.5 Tables**

No tables for this Section

## **6.5 Project 5 – DAC Fund for Feasibility-Level Studies and Well Destruction Program**

### **6.5.1 Baseline Condition**

Project funding will be used to: perform feasibility studies, environmental and engineering work necessary to construct facilities to solve defined water supply problems, and buy down the cost of destroying unused wells that pose a threat to DAC water supplies.

The DAC communities do not have the resources to fund feasibility studies and engineering design needed to secure funding to construct facilities that would solve their problems. As a result of the project, several DACs will be provided the necessary materials to proceed with application for project construction funding and subsequently request construction bids.

Agricultural owners often regard unused wells as potential backup in the event that additional supplies are needed. However, these older wells were often constructed without regard to isolating poor quality zones or deteriorate with time, in either case allowing poor quality water to enter higher quality production zones. This can contribute significantly to water quality problems in near-by urban supply wells. The two most common contaminants in DAC water supply wells are Arsenic and Nitrate (discussed below).

### **6.5.2 Project Performance**

Project 5 will provide funding to address two critical water supply needs for several disadvantaged communities (DACs) in the region:

1. Perform feasibility and engineering studies necessary to construct facilities to solve defined water supply problems in several DACs including:
  - Allensworth Community Services District
  - Ducor Community Services District
  - City of Wasco
  - City of Delano
  - Lost Hills Utility District

The project will address critical water supply needs in these DACs by providing funding for project development not available from other sources.

2. Identify and partially fund proper destruction of up to 30 unused wells that may contribute to DAC water quality problems. Contribution to well destruction costs will motivate landowners to accelerate proper permanent abandonment of unused wells that due to poor design or deterioration may allow contaminants to enter production zones used for DAC supply.



The program would be administered under the direction of Semitropic WSD in collaboration with the affected DACs and community interest groups as well as the Counties of Kern and Tulare.

### 6.5.3 Assessment

Each benefit requires a slightly different assessment of the deliveries as described below.

**Improved reliability of existing DAC water supplies** – Each of the DAC service providers keeps records of response to system interruptions and other operational problems. These records will be the basis of measuring improvement in system reliability.

**Protect water quality in DAC supplies** – Water quality samples will be taken from selected monitoring wells annually to document any change in water quality due to the destruction of problem wells.

With regard to quantification of actual project benefits “upon completion of the project”, it is noted that this will not be practicable immediately upon completion; rather, it could take several years depending on the timing of completion of DAC projects and changes due to well destruction to obtain a meaningful measure of Project benefits.

#### Exhibit 6.5-1

Project 5 Summary of Monitoring, Assessment, and Performance Measure

Project Goal	Desired Outcome	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Improved water supply reliability.	Improve DAC water supply systems to increase reliability.	Improved water supply reliability.	Final plans for improvements to DAC water supply systems.  Destruction of problem wells.	Completion of plans for upgrading DAC systems.  Well destruction reports.	Completion of plans for upgrading DAC systems within 2 years.  10 wells destroyed per year.
Improve water quality if DAC supply.	100% of samples meet water quality standards.	Water quality measurements of water delivered.	Consistently meet water quality standards.	Direct samples of delivered water.	100% of samples meet water quality standards.

**Exhibit 6.5-2**

Questions Based on Criteria Provided in the Project Solicitation Package

Items	Explanation
Is the project contained in the proposal consistent with the Basin Plan?	Yes, the Tulare Lake Regional Basin Plan has goals to improve water quality for municipal use. The project studies and destruction of problem wells are both consist with Basin Plan objectives.
Do the output indicators effectively track output?	Yes, the completion of the individual engineering studies will effectively track completion of the project. Destruction of wells will be tracked by filing of required reports with local and State agencies.
List the output indicators and describe relevance of indicators to track output of the project.	Completion of the system improvement studies will allow DACs to apply for construction funding. Well destruction records are required by state law..
Are the outcome indicators adequate to evaluate change resulting from this project?	Yes, The completion of the system improvement studies will provide the basis for funding construction of actual projects. Well destruction records certify that the well is no longer a conduit for pollution.
Describe the importance of outcome indicators to evaluate change resulting from the project	The outcome indicators will document meeting the threshold information to acquire funding for DAC projects. Destruction of problem wells eliminates them as a potential avenue for degradation of high quality aquifer zones that are the source of DAC water supply.
Is it feasible to meet the targets within the life of the proposal?	Yes, procedures for planning and engineering studies for water system improvements are well established. Well destruction techniques are well developed and reflected in existing industry standards.

**Exhibit 6.5-3**

Project 5 Summary of Monitoring Plan

Monitoring Plan Features	Monitoring Plan Details
Monitoring Parameters	Document progress and completion of engineering studies.  Document identification and subsequent destruction of problem wells.
Location of facilities to be monitored and entity.	Water system studies will be performed in the five DACs: Allensworth, Ducor, City of Wasco, City of Delano, and Lost Hills.  Well destruction activities will be focused near any DAC in the Poso Creek IRWM Region.
Measures to remedy or react to problems encountered during monitoring.	The study teams will employ standard project management techniques.  Semitropic will monitor the Well Destruction program.
Monitoring Frequency	Study teams will report progress monthly.  The well destruction team will report progress monthly to Semitropic.
Frequency of performance evaluation and reporting.	Reporting will be accomplished through monthly reports to Semitropic.

**6.5.4 Appendices**

No appendices for this Section.

### **6.5.5 Tables**

No tables for this Section

## **6.6 Project 6 – Consolidation of Bishop Acres Drinking Water Distribution System**

### **6.6.1 Baseline Condition**

The Bishop Acres is currently served by a standalone water system which has 26 connections and is operated by the Bishop Acres Mutual Water Company. The system was built approximately 40 years ago and currently relies on a single well for supply. There is no backup in case of electrical failure or during well maintenance. The system has no blending or treatment thus allowing blending in case it is necessary to meet water quality standards necessary to protect the health of their customers.

### **6.6.2 Project Performance**

Project 6 would allow the City of Shafter to incorporate Bishop Acres into its service area. To do so the City would modify its system to include the following:

- Approximately 800 linear feet of water distribution main (under 16-inch in diameter) to Bishop Acres
- Approximately 275 foot feet of boring casing and carrier pipe across BNSF rail mainline and County of Kern roadway
- New valves and control equipment at the interconnection
- Rehabilitation and automation of the existing Bishop Acres well

The City would begin construction upon acquisition of the grant in accordance with the schedule show in Attachment 5. Construction would be completed in the second quarter of 2012. The Bishop Acres well will be incorporated into the City water supply system.

### **6.6.3 Assessment**

Each benefit requires a slightly different assessment of the deliveries as described below.

**Improved reliability of existing DAC water supply** –The City constantly monitors the operation of its water supply system. Water supply interruptions trigger an immediate response and detailed reporting. City response will be documented with an evaluation of corrections needed to avoid further interruptions.

**Maintain reasonable water supply costs to a DAC** – The City bills its customers for both water use and underlying capital costs. Water use costs reflect direct operating costs and thus improved reliability will result in controlling water use costs.

**Protect water quality in a DAC supply** – Water quality samples will continue to be taken pursuant to State requirements with results reported to system customers on a regular basis.

With regard to quantification of actual project benefits “upon completion of the project”, it is noted that this will not be practicable immediately upon completion; rather, it could take several years, depending on a number of factors, to obtain a meaningful measure of Project benefits.

**Exhibit 6.6-1**

Project 6 Summary of Monitoring, Assessment, and Performance Measure

Project Goal	Desired Outcome	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Increase water supply reliability.	Integrate small neighborhood supply with larger municipal system.	Improved water supply reliability.	Physical and operational integration of neighborhood and City systems  Upgrade of existing well	Completion of construction of connection.  Rehabilitation of well.	Elimination of service interruptions.
Minimize water supply costs.	Stabilize monthly costs while improving reliability.	Monthly bills to customers.  Number of service interruptions.  Water quality	No increase in monthly customer bills.  Decrease or elimination of service interruptions.	Monthly billings  Service records	No increase in monthly customer bills for 24 months.  75 % decrease in service interruptions.
Improve quality of water delivered.	100% of samples meet water quality standards.	Water quality measurements of water delivered.	Consistently meet water quality standards.	Direct samples of delivered water.	100% of samples meet water quality standards

**Exhibit 6.6-2**

Questions Based on the Criteria Provided in Proposal Solicitation Package

Items	Explanation
Is the project contained in the proposal consistent with the Basin Plan?	Yes, the Tulare Lake Regional Basin Plan has goals to improve water quality for municipal use. The integration of the two systems helps accomplish that goal.
Do the output indicators effectively track output?	Yes, the City is responsible for operating its water supply system and has been doing so and tracking operations for decades.
List the output indicators and describe relevance of indicators to track output of the project.	Completion of the system interconnection and rehabilitation of the Bishop Acres well will allow integration of operations. Water supply costs and water quality sampling are indicators that are subject to clear legal standards.
Are the outcome indicators adequate to evaluate change resulting from this project?  Describe the importance of outcome indicators to evaluate change resulting from the project.	Yes, there is a significant historic record of use of the original facilities. Future operations will be subject to ongoing measurements.  The outcome indicators are the same as those used on a regular basis by water supply systems throughout the state.

Is it feasible to meet the targets within the life of the proposal?	Yes, issues surrounding system integration and well rehabilitation are well understood and are subject to well established management techniques.
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#### **Exhibit 6.6-3**

##### **Project 6 Summary of Monitoring Plan**

<b>Monitoring Plan Features</b>	<b>Monitoring Plan Details</b>
Monitoring Parameters	Document progress and completion of construction. Document progress and completion of well rehabilitation.
Location of facilities to be monitored and entity.	Bishop Acres service area and new connection facilities. Water quality samples will be taken within the City water distribution system..
Measures to remedy or react to problems encountered during monitoring.	City will employ standard construction management techniques. City will monitor source-water quality and employ blending to achieve water quality standards.
Monitoring Frequency	Daily during construction and well rehabilitation. Water quality measurements will be taken pursuant to State requirements.
Frequency of performance evaluation and reporting.	Reporting will be accomplished through regular billings and bi-annual water quality reports to the public.

#### **6.6.4 Appendices**

No appendices for this Section.

#### **6.6.5 Tables**

No tables for this Section

## **6.7 Project 7 – North Shafter Sewer Hook-up Reimbursement Fund**

### **6.7.1 Baseline Condition**

Project 7 provides the mechanism and economic incentive for DAC households to complete their individual house hook-ups to the new City sewer collection system. All the households in the project area are on septic tanks and will remain on them until their house connected to the new sewer line. Most of the septic tanks in the project area are quite old with failing leach fields. Some households use deep seepage pits that drain the septic tank leachate closer to the groundwater. In 2005, 71% of the area's 240 properties reported failing septic systems and/or use of greywater disposal into their lawns to avoid overloading of septic systems and reduce septic tank pumping. North Shafter residents report that many are forced to have their septic tanks pumped three or more times per year. The City of Shafter and Regional Water Quality Control Board have declared a potential pollution problem for the area based on local well contamination from failing septic systems.

### **6.7.2 Project Performance**

Project 7 would complement construction of a collection system and trunkline that will connect North Shafter to the City of Shafter/North of the River regional wastewater system and the abandonment of existing septic systems. Specifically, the funding would be used to pay for 240 new connections to a new sewer collection system under construction by the City of Shafter.

The project will help a disadvantaged community prevent nonpoint source contaminants such as Nitrates and other pollutants from being discharged to the groundwater in the Poso Creek IRWM Region and City of Shafter. The wastewater collected will be sent to the City of Shafter/North of the River regional wastewater treatment plant where it will be treated and recycled for use on agricultural crops near the treatment plant site.

The City would begin construction upon acquisition of the grant in accordance with the schedule show in Attachment 5. Construction would be completed in the second quarter of 2012.

### **6.7.3 Assessment**

Each benefit requires a slightly different assessment of the deliveries as described below.

**Reduced risk of pollution of existing DAC water supply** – In 2005, 71% of the area's 240 properties reported failing septic systems and/or use of greywater disposal into their lawns to avoid overloading of septic systems and reduce septic tank

pumping. The City will document the number of households that connect to the sewer system. The City will monitor the number of failures and pump-outs within the expanded service area.

**Maintain reasonable sewer costs in a DAC** – North Shafter residents report that many are forced to have their septic tanks pumped three or more times per year. The frequency of pump outs will decrease as households are connected to the sewer system.

**Protect water quality in a DAC supply** – Water quality samples will be taken from local water supply wells to document any change in water quality due to the expansion of the sewer service area. The City has monitored and will continue to monitor its production wells for water quality.

With regard to quantification of project benefits to water quality in a DAC water supply “upon completion of the project”, it is noted that this will likely take several years, depending on climate and other factors, to obtain a meaningful measure of Project water quality benefits.



**Exhibit 6.7-1**

## Project 7 Summary of Monitoring, Assessment, and Performance Measure

Project Goal	Desired Outcome	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Reduced risk of pollution of existing DAC water supply.	Connect 240 homes to the municipal sanitary sewer system.	Connect to sewer system	All households connected to sewer system	Completion of construction of connection.	Elimination of septic system failures and spills.
Maintain reasonable sewer costs in a DAC.	Minimize installation costs while improving waste disposal process.	Monthly bills to customers. Direct cost of connection to homeowners	Affordable monthly customer bills. Connections at minimal cost to homeowners.	Monthly billings. Service connection costs.	Affordable customer bills. 100 % connections in new service area.
Protect water quality in a DAC supply.	100% of samples meet water quality standards.	Water quality measurements of water delivered.	Consistently meet water quality standards.	Direct samples of delivered water.	100% of samples meet water quality standards

**Exhibit 6.7-2**

## Questions Based on Criteria Provided in Project Solicitation Package

Items	Explanation
Is the project contained in the proposal consistent with the Basin Plan?	Yes, the Tulare Lake Regional Basin Plan has goals to eliminate sources of pollution from septic systems. The connection of all homes in the new service area helps accomplish that goal.
Do the output indicators effectively track output?	Yes, the City is responsible for expanding and operating its sewage collection system and has been doing so and tracking operations in other areas for decades.
List the output indicators and describe relevance of indicators to track output of the project.	Connection to all homes in the new service area will allow discontinuance of septic system use and removal of outdated facilities. Sewer service costs and water quality sampling are indicators that are subject to clear legal standards.
Are the outcome indicators adequate to evaluate change resulting from this project?	Yes, there is a significant historic record of failure of outdated facilities. Future operations will be subject to ongoing measurements.
Describe the importance of outcome indicators to evaluate change resulting from the project	The outcome indicators are the same as those used on a regular basis by sewer service systems throughout the state.
Is it feasible to meet the targets within the life of the proposal?	Yes, issues surrounding new connections and septic system removal are well understood and are subject to well established management techniques.

**Exhibit 6.7-3**

## Project 7 Summary of Monitoring Plan

Monitoring Plan Features	Monitoring Plan Details
Monitoring Parameters	Document progress and completion of residence connection. Document progress and completion of septic system removal.
Location of facilities to be monitored and entity.	North Shafter service area and City supply wells will be monitored by City.
Measures to remedy or react to problems encountered during monitoring.	City will employ standard construction management techniques. City will monitor source-water quality and employ blending to achieve water quality standards.
Monitoring Frequency	Daily during construction and well rehabilitation. Water quality measurements will be taken pursuant to State requirements.
Frequency of performance evaluation and reporting.	Reporting will be accomplished through regular billings and bi-annual water quality reports to the public.

**6.7.4 Appendices**

No appendices for this Section.

**6.7.5 Tables**

No tables for this Section

## **6.8 Project 8 – Water Meters in Disadvantaged Community Service Area**

### **6.8.1 Baseline Condition**

Project 8 provides funding to retrofit and update 600 meters to Shafter's current Automatic Meter Reading standard in the areas surrounding the City that have, in the past, connected their drinking water systems with the City. These connected areas include North Shafter, South Shafter and Southwest Shafter water improvement areas. Having these outside the City connections equipped with meters and radios to transmit consumption electronically will help the City avoid costs for retrofitting and labor for manual reads which would in turn cause costs to be passed along to severely disadvantaged communities.

### **6.8.2 Project Performance**

The benefits of retrofitting and updating 600 meters to Shafter's current Automatic Meter Reading standard in the North Shafter, South Shafter and Southwest Shafter water improvement areas include better management of the City's water supply and avoided time and energy spent in reading the meters. Direct benefits include avoided costs of monthly meter reading and reduced vehicle emissions. Indirect costs include better management of the City's water supply system leading to prompt leak repair and other water conservation measures.

The City would begin construction upon acquisition of the grant in accordance with the schedule show in Attachment 5. Construction would be completed in the second quarter of 2012.

### **6.8.3 Assessment**

Each benefit requires a slightly different assessment of the deliveries as described below.

**Maintain reasonable operating costs in a DAC** – The approximate value of the City manually reading meters in the designated improvement areas is approximately \$36,000 per year. By equipping radios with the meter assemblies, the City's utility customers in these severely disadvantaged communities will see savings on their water bills.

**Reduction of losses and waste** – The installation of better metering would improve leak detection and repair to avoid water loss and avoid unnecessary water charges.

**Exhibit 6.8-1**

## Project 8 Summary of Monitoring, Assessment, and Performance Measure

Project Goal	Desired Outcome	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Maintain reasonable water service costs in a DAC	Minimize installation costs while improving metering efficiency	Monthly bills to customers  Cost of meter upgrades	Affordable monthly customer bills  Meter upgrades at minimal cost to homeowners	Monthly billings  Service connection costs	Affordable customer bills  100 % connections in new service area
Reduction of losses and waste in a DAC supply	Reduced system losses	Difference between production and metered delivery	Reduced difference between production and metered delivery	Water meters at supply wells and in service areas	Reduction in water losses

**Exhibit 6.8-2**

## Questions Based on the Criteria Provided in Project Solicitation Package

Items	Explanation
Is the project contained in the proposal consistent with the Basin Plan?	The project is consistent with the Tulare Lake Basin plan objectives to reduce ground water decline.
Do the output indicators effectively track output?	Yes, the City is responsible for operating and maintaining its water supply system and has been doing so and tracking operations in other areas for decades.
List the output indicators and describe relevance of indicators to track output of the project.	Upgrading water meters in the areas targeted will allow more efficient measurement of water use. Water service costs are indicators that are subject to clear legal standards.
Are the outcome indicators adequate to evaluate change resulting from this project?	Yes, there is a significant historic record of water service costs, including meter reading in the target areas. Future operations will be subject to ongoing measurements.
Describe the importance of outcome indicators to evaluate change resulting from the project	The outcome indicators are the same as those used on a regular basis by public water service systems throughout the state.
Is it feasible to meet the targets within the life of the proposal?	Yes, issues surrounding meter upgrades are well understood and are subject to well established management techniques.

**Exhibit 6.8-3****Project 8 Summary of Monitoring Plan**

<b>Monitoring Plan Features</b>	<b>Monitoring Plan Details</b>
Monitoring Parameters	Document progress and completion of meter upgrades Document costs of meter readings Document leak identification and response.
Location of facilities to be monitored and entity	North Shafter, South Shafter and Southwest Shafter water improvement areas and City supply wells will be monitored by City
Measures to remedy or react to problems encountered during monitoring	City will employ standard construction management techniques City will monitor source-water quality and employ blending to achieve water quality standards
Monitoring Frequency	Weekly during meter installation Water quality measurements will be taken pursuant to State requirements
Frequency of performance evaluation and reporting	Reporting will be accomplished through regular billings and bi-annual water quality reports to the public.

**6.8.4 Appendices**

No appendices for this Section.

**6.8.5 Tables**

No tables for this Section